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STAAS & HALSEY LLP SUITE 700 1201 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005			DATSKOVSKIY, SERGEY	
			ART UNIT	PAPER NUMBER
			2121	

DATE MAILED: 02/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/763,772

Applicant(s)

DECO ET AL.

Examiner

Sergey Datskovskiy

Art Unit

2121

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2121

DETAILED ACTION

Status of the claims

Claims 1-16 were originally presented. After the First Non-final Office Action, claim 8 was amended. Claims 1-16 are still pending in the Instant Application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the Office presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Office to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 8, 11 and 14 are rejected under 35 U.S.C. 103(a) as being obvious over *Jourjine* United States Patent Number (USPN) 4,953,099 "Information

Art Unit: 2121

Discrimination Cell" (Aug. 28, 1990) in view of *Clymer* USPN 4,518,866 "Method of and circuit for simulating neurons" (May 21, 1985) and in further view of *Ueda et al* USPN 5,119,438 "Recognizing apparatus" (Jun. 2, 1992).

Regarding claim 1:

Jourjine teaches a method (Abstract) for training a neural network that contains pulsed neurons, comprising: forming discrimination values dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural network (Fig. 1); training the neural network for a first time span (Fig. 4; column 5, lines 31-59) such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: shortening the first time span to a second time span (column 2, lines 37-55; column 5, lines 2-5); forming a second discrimination value for the second time span. However, *Jourjine* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value and choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value while *Clymer* teaches shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); forming a second discrimination value for the shortened second time span; iteratively (column 3, lines 48-68; column 4, lines 1-11) continuing to shorten the second time span and form a second discrimination

Art Unit: 2121

value for each shortened second time span until the second discrimination value is different from the first discrimination value (Abstract) and *Ueda et al* teaches choosing as the trained neural network (column 2, lines 25-52) the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value.

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer* and *Ueda et al* for the purpose of simulating the neuron's function of learning and setting the structure and weights of a neural network selected by the network selecting means.

Regarding claim 8:

Jourjine teaches a method (Abstract) for classification of a sequence of input quantities upon employment of a neural network that contains pulsed neurons and was trained, comprising to the following steps: forming discrimination values dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural network (Fig. 1); training the neural network for a first time span (Fig. 4;

Art Unit: 2121

column 5, lines 31-59) such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: shortening the first time span to a second time span (column 2, lines 37-55; column 5, lines 2-5); forming a second discrimination value for the second time span. However, *Jourjine* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value and choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value while *Clymer* teaches shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); forming a second discrimination value for the shortened second time span; iteratively (column 3, lines 48-68; column 4, lines 1-11) continuing to shorten the second time span and form a second discrimination value for each shortened second time span until the second discrimination value is different from the first discrimination value (Abstract) and *Ueda et al* teaches choosing as the trained neural network (column 2, lines 25-52) the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value; supplying the sequence of input quantities to the neural network; forming a classification signal that indicates what kind of sequence of input quantities the supplied sequence is (Fig 1, items 1-3; Fig. 2, items S1-S2; Fig. 4).

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer* and *Ueda et al* for the purpose of simulating the neuron's function of learning and setting the structure and weights of a neural network selected by the network selecting means.

Regarding claim 11:

Jourjine teaches a neural network that contains pulsed neurons and has been trained according to the following steps: discrimination values are formed dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural network (Fig. 1); the neural network is trained such that for a first time span (Fig. 4; column 5, lines 31-59) a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: the first time span is shortened to a second time span (column 2, lines 37-55; column 5, lines 2-5); a second discrimination value is formed for the second time span. However, *Jourjine* doesn't explicitly teach the second time span is shortened to a shortened second time span if the second discrimination

Art Unit: 2121

value is the same as the first discrimination value and the trained neural network is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value while *Clymer* teaches the second time span is shortened to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); a second discrimination value is formed for the shortened second time span; the second time span is shortened and a second discrimination value is formed for each shortened second time span, iteratively (column 3, lines 48-68; column 4, lines 1-11), until the second discrimination value is different from the first discrimination value (Abstract) and *Ueda et al* teaches the trained neural network (column 2, lines 25-52) is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value.

Motivation – The portions of the claimed neural network would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer* and *Ueda et al* for the purpose of simulating the neuron's function of learning and setting the structure and weights of a neural network selected by the network selecting means.

Art Unit: 2121

Regarding claim 14:

Jourjine teaches a system for training a neural network (column 1, lines 13-25) that contains pulsed neurons, comprising: a processor that is configured such that the following steps implemented: the neural network is trained such that for a first time span of data input (Fig. 4; column 5, lines 31-59) a discrimination value is maximized, as a result whereof a maximum first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: the first time span of data input is shortened to a second time span of data input (column 2, lines 37-55; column 5, lines 2-5). However, *Jourjine* doesn't explicitly teach the second time span of data input is shortened to a shortened second time span if the second discrimination value is the same as the first discrimination value and the trained neural network is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value while *Clymer* teaches the second time span of data input is shortened to a shortened second time span of data input if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); a second discrimination value is formed for the shortened second time span of data input; the second time span of data input is shortened and a second discrimination value is formed for each shortened second time span of data input, iteratively (column 3, lines 48-68; column 4, lines 1-11), until the second discrimination value is different from the first discrimination value (Abstract) and *Ueda et al* teaches the trained neural network (column 2, lines 25-52) is chosen to be the neural

network of the last iteration when the second discrimination value was the same as the first discrimination value.

Motivation – The portions of the claimed system would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer* and *Ueda et al* for the purpose of simulating the neuron's function of learning and setting the structure and weights of a neural network selected by the network selecting means.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being obvious over *Jourjine* in view of *Clymer* in view of *Ueda et al* and further in view of *Peng et al* "Generalization and Comparison of Alopex Learning Algorithm and Random Optimization Method for Neural Networks" (May 1998).

Regarding claim 2:

Jourjine teaches a method (Abstract) for training a neural network that contains pulsed neurons, comprising: forming discrimination values dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural

Art Unit: 2121

network (Fig. 1); training the neural network for a first time span (Fig. 4; column 5, lines 31-59) such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: shortening the first time span to a second time span (column 2, lines 37-55; column 5, lines 2-5); forming a second discrimination value for the second time span. However, *Jourjine* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value, choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value and an optimization method that is not gradient based is utilized for the maximization of at least one of the first discrimination value and of the second discrimination value while *Clymer* teaches shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); forming a second discrimination value for the shortened second time span; iteratively (column 3, lines 48-68; column 4, lines 1-11) continuing to shorten the second time span and form a second discrimination value for each shortened second time span until the second discrimination value is different from the first discrimination value (Abstract), *Ueda et al* teaches choosing as the trained neural network (column 2, lines 25-52) the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value and *Peng et al* teaches an optimization method that is not gradient based is utilized for the

Art Unit: 2121

maximization of at least one of the first discrimination value and of the second discrimination value (page 1147, Abstract).

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24) and converging faster (*Peng et al*, page 1148, section V, paragraph 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer*, *Ueda et al* and *Peng et al* for the purpose of simulating the neuron's function of learning, setting the structure and weights of a neural network selected by the network selecting means and converging faster.

Regarding claim 3:

The rejection of claim 3 is the same as that for claim 2 as recited above since the stated limitations of the claim are set forth in the references.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being obvious over *Jourjine* in view of *Clymer* in view of *Ueda et al* and further in view of *Deco et al* "Information Transmission and Temporal Code in Central Spiking Neurons" (December 8, 1997).

Regarding claims 4:

Art Unit: 2121

Jourjine teaches a method (Abstract) for training a neural network that contains pulsed neurons, comprising: forming discrimination values dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural network (Fig. 1); training the neural network for a first time span (Fig. 4; column 5, lines 31-59) such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: shortening the first time span to a second time span (column 2, lines 37-55; column 5, lines 2-5); forming a second discrimination value for the second time span. However, *Jourjine* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value, choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value and the first discrimination value $I(T)$ satisfies the following rule:

$$t_1^{(1)}, \dots, t_m^{(1)}, \dots, t_{k1}^{(1)}, t_1^{(2)}, \dots, t_m^{(2)}, \dots, t_{k2}^{(2)}, \dots,$$

$$I(T) = I \left(s; \left\{ \begin{array}{l} t_1^{(1)}, \dots, t_m^{(1)}, \dots, t_{k1}^{(1)}, t_1^{(2)}, \dots, t_m^{(2)}, \dots, t_{k2}^{(2)}, \dots, \\ t_1^{(n)}, \dots, t_m^{(n)}, \dots, t_{kn}^{(n)}, \dots, t_1^{(N)}, \dots, t_m^{(N)}, \dots, t_{kN}^{(N)} \end{array} \right\} \right),$$

$$t_1^{(n)}, \dots, t_m^{(n)}, \dots, t_{kn}^{(n)}, \dots, t_1^{(N)}, \dots, t_m^{(N)}, \dots, t_{kN}^{(N)}$$

wherein

- s references input quantities,
- $t_m^{(n)}$ references a pulse that is generated by a pulsed neuron n at a time m within a time span $[0, T]$,

Art Unit: 2121

- k_n ($n=1, \dots, N$) references a point in time at which the pulsed neuron n has generated the last pulse within the time span $[0, T]$, and

N references a plurality of pulsed neurons contained in the neural network while *Clymer* teaches shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); forming a second discrimination value for the shortened second time span; iteratively (column 3, lines 48-68; column 4, lines 1-11) continuing to shorten the second time span and form a second discrimination value for each shortened second time span until the second discrimination value is different from the first discrimination value (Abstract), *Ueda et al* teaches choosing as the trained neural network (column 2, lines 25-52) the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value and *Deco et al* teaches the first discrimination value $I(T)$ satisfies the following rule:

$$t_1^{(1)}, \dots, t_m^{(1)}, \dots, t_{k1}^{(1)}, t_1^{(2)}, \dots, t_m^{(2)}, \dots, t_{k2}^{(2)}, \dots,$$

$$I(T) = I(s; \{ \dots \}),$$

$$t_1^{(n)}, \dots, t_m^{(n)}, \dots, t_{kn}^{(n)}, \dots, t_1^{(N)}, \dots, t_m^{(N)}, \dots, t_{kN}^{(N)}$$

wherein

- s references input quantities,
- $t_m^{(n)}$ references a pulse that is generated by a pulsed neuron n at a time m within a time span $[0, T]$,
- k_n ($n=1, \dots, N$) references a point in time at which the pulsed neuron n has generated the last pulse within the time span $[0, T]$, and
- N references a plurality of pulsed neurons contained in the neural network

Art Unit: 2121

(page 4697, paragraph 2) and decision time as related to discriminability (page 4699, paragraph 2).

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24) and efficiently discriminating input signals (*Deco et al*, page 4700, paragraph 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer*, *Ueda et al* and *Deco et al* for the purpose of simulating the neuron's function of learning, setting the structure and weights of a neural network selected by the network selecting means and efficiently discriminating input signals.

Art Unit: 2121

Regarding claim 5:

The rejection of claim 5 is similar to that for claim 4 as recited above since the stated limitations of the claim are set forth in the references. Claim 5's limitations difference is taught in *Deco et al*:

- the first discrimination value $I(T)$ satisfies the following rule:

$$I(T) = - \int p(\text{out}) \cdot \ln(p(\text{out})) dt_1^{(1)} \dots dt_{kN}^{(N)} + \sum_{j=1}^s p_j \int p(\text{out}|s^{(j)}) \cdot \ln(p(\text{out}|s^{(j)})) dt_1^{(1)} \dots dt_{kN}^{(N)}$$

with

$$p(\text{out}) = \sum_{j=1}^s p_j p(\text{out}|s^{(j)}),$$

wherein

- $s^{(j)}$ references an input quantity that is applied to the neural network at a time j ,
- p_j references a probability that the input quantity $s^{(j)}$ is applied to the neural network at a point in time j ,
- $p(\text{out}|s^{(j)})$ references a conditioned probability that a pulse is generated by a pulsed neuron in the neural network under the condition that the input quantity $s^{(j)}$ is applied to the neural network at a point in time j

(page 4697, paragraph 3, "In the second...in the interval $[t', t' + T]$ "; page 4698, paragraph 1, "where t' is...same rate R ")

Claims 6-7, 9-10, 12-13 and 15-16 are rejected under 35 U.S.C. 103(a) as being obvious over *Jourjine* in view of *Clymer* in view of *Ueda et al* and further in view of

Belmonte "Prediction of attention in autism from single-trial EEG using artificial neural networks" (August 1997).

Regarding claim 6:

Jourjine teaches a method (Abstract) for training a neural network that contains pulsed neurons, comprising: forming discrimination values dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural network (Fig. 1); training the neural network for a first time span (Fig. 4; column 5, lines 31-59) such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: shortening the first time span to a second time span (column 2, lines 37-55; column 5, lines 2-5); forming a second discrimination value for the second time span. However, *Jourjine* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value, choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value and the training sequence of inputs quantities are of measured physical signals while *Clymer* teaches shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); forming a second discrimination value for the shortened second time span; iteratively (column 3, lines 48-68; column 4, lines 1-11) continuing to shorten the second time span and form a second discrimination value for

Art Unit: 2121

each shortened second time span until the second discrimination value is different from the first discrimination value (Abstract), *Ueda et al* teaches choosing as the trained neural network (column 2, lines 25-52) the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value and *Belmonte* teaches the training sequence of inputs quantities are is of measured physical signals (page 1, Introduction).

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24) and seeing some success in the application of ANNs to single-trial EEG analysis (*Belmonte*, page 3, right column, last paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer*, *Ueda et al* and *Belmonte* for the purpose of simulating the neuron's function of learning, setting the structure and weights of a neural network selected by the network selecting means and seeing some success in the application of ANNs to single-trial EEG analysis.

Regarding claim 7:

The rejection of claim 7 is the same as that for claim 6 as recited above since the stated limitations of the claim are set forth in the references.

Regarding claim 9:

Jourjine teaches a method (Abstract) for classification of a sequence of input quantities upon employment of a neural network that contains pulsed neurons and was trained, comprising to the following steps: forming discrimination values dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural network (Fig. 1); training the neural network for a first time span (Fig. 4; column 5, lines 31-59) such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: shortening the first time span to a second time span (column 2, lines 37-55; column 5, lines 2-5); forming a second discrimination value for the second time span. However, *Jourjine* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value, choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value and the training sequence of input quantities and the sequence of input quantities are measured physical signals while *Clymer* teaches shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); forming a second discrimination value for the shortened second time span; iteratively (column 3, lines 48-68; column 4, lines 1-11) continuing to shorten the second time span and form a second discrimination value for

Art Unit: 2121

each shortened second time span until the second discrimination value is different from the first discrimination value (Abstract), *Ueda et al* teaches choosing as the trained neural network (column 2, lines 25-52) the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value; supplying the sequence of input quantities to the neural network; forming a classification signal that indicates what kind of sequence of input quantities the supplied sequence is (Fig 1, items 1-3; Fig. 2, items S1-S2; Fig. 4) and *Belmonte* teaches the training sequence of input quantities and the sequence of input quantities are measured physical signals (page 1, Introduction).

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24) and seeing some success in the application of ANNs to single-trial EEG analysis (*Belmonte*, page 3, right column, last paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer*, *Ueda et al* and *Belmonte* for the purpose of simulating the neuron's function of learning, setting the structure and weights of a neural network selected by the network selecting means and seeing some success in the application of ANNs to single-trial EEG analysis.

Regarding claims 10:

The rejection of claim 10 is the same as that for claim 9 as recited above since the stated limitations of the claim are set forth in the references.

Regarding claim 12:

Jourjine teaches a neural network that contains pulsed neurons and has been trained according to the following steps: discrimination values are formed dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural network (Fig. 1); the neural network is trained such that for a first time span (Fig. 4; column 5, lines 31-59) a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: the first time span is shortened to a second time span (column 2, lines 37-55; column 5, lines 2-5); a second discrimination value is formed for the second time span. However, *Jourjine* doesn't explicitly teach the second time span is shortened to a shortened second time span if the second discrimination value is the same as the first discrimination value, the trained neural network is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value and the network is utilized for the classification of a physical signal while *Clymer* teaches the second time span is shortened to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); a second discrimination value is formed for the shortened second time span; the second time span is shortened and a second

Art Unit: 2121

discrimination value is formed for each shortened second time span, iteratively (column 3, lines 48-68; column 4, lines 1-11), until the second discrimination value is different from the first discrimination value (Abstract), *Ueda et al* teaches the trained neural network (column 2, lines 25-52) is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value and *Belmonte* teaches the network is utilized for the classification of a physical signal (page 1, Introduction).

Motivation – The portions of the claimed neural network would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24) and seeing some success in the application of ANNs to single-trial EEG analysis (*Belmonte*, page 3, right column, last paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer* and *Ueda et al* for the purpose of simulating the neuron's function of learning, setting the structure and weights of a neural network selected by the network selecting means and seeing some success in the application of ANNs to single-trial EEG analysis.

Regarding claim 13:

Jourjine teaches a neural network that contains pulsed neurons and has been trained according to the following steps: discrimination values are formed dependent on pulses that are formed by the pulsed neurons as well as on a training sequence of input quantities (Figs. 4-6; column 5, lines 58-68; column 6, lines 1-44) that are supplied to the neural network (Fig. 1); the neural network is trained such that for a first time span (Fig. 4; column 5, lines 31-59) a discrimination value is maximized, as a result whereof a first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: the first time span is shortened to a second time span (column 2, lines 37-55; column 5, lines 2-5); a second discrimination value is formed for the second time span. However, *Jourjine* doesn't explicitly teach the second time span is shortened to a shortened second time span if the second discrimination value is the same as the first discrimination value, the trained neural network is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value and utilized for the classification of an electroencephalogram signal while *Clymer* teaches the second time span is shortened to a shortened second time span if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); a second discrimination value is formed for the shortened second time span; the second time span is shortened and a second discrimination value is formed for each shortened second time span, iteratively (column 3, lines 48-68; column 4, lines 1-11), until the second discrimination value is different from the first discrimination value (Abstract), *Ueda et al* teaches the trained

Art Unit: 2121

neural network (column 2, lines 25-52) is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value and *Belmonte* teaches utilized for the classification of an electroencephalogram signal (page 1, Introduction).

Motivation – The portions of the claimed neural network would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24) and seeing some success in the application of ANNs to single-trial EEG analysis (*Belmonte*, page 3, right column, last paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer* and *Ueda et al* for the purpose of simulating the neuron's function of learning, setting the structure and weights of a neural network selected by the network selecting means and seeing some success in the application of ANNs to single-trial EEG analysis.

Regarding claim 15:

Jourjine teaches a system for training a neural network (column 1, lines 13-25) that contains pulsed neurons, comprising: a processor that is configured such that the following steps implemented: the neural network is trained such that for a first time span of data input (Fig. 4; column 5, lines 31-59) a discrimination value is maximized, as a

result whereof a maximum first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: the first time span of data input is shortened to a second time span of data input (column 2, lines 37-55; column 5, lines 2-5). However, *Jourjine* doesn't explicitly teach the second time span of data input is shortened to a shortened second time span if the second discrimination value is the same as the first discrimination value, the trained neural network is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value and the network is utilized for the classification of a physical signal while *Clymer* teaches the second time span of data input is shortened to a shortened second time span of data input if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); a second discrimination value is formed for the shortened second time span of data input; the second time span of data input is shortened and a second discrimination value is formed for each shortened second time span of data input, iteratively (column 3, lines 48-68; column 4, lines 1-11), until the second discrimination value is different from the first discrimination value (Abstract), *Ueda et al* teaches the trained neural network (column 2, lines 25-52) is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value and *Belmonte* teaches the network is utilized for the classification of a physical signal (page 1, Introduction).

Motivation – The portions of the claimed system would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a

Art Unit: 2121

biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24) and seeing some success in the application of ANNs to single-trial EEG analysis (*Belmonte*, page 3, right column, last paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer*, *Ueda et al* and *Belmonte* for the purpose of simulating the neuron's function of learning, setting the structure and weights of a neural network selected by the network selecting means and seeing some success in the application of ANNs to single-trial EEG analysis.

Regarding claim 16:

Jourjine teaches a system for training a neural network (column 1, lines 13-25) that contains pulsed neurons, comprising: a processor that is configured such that the following steps implemented: the neural network is trained such that for a first time span of data input (Fig. 4; column 5, lines 31-59) a discrimination value is maximized, as a result whereof a maximum first discrimination value is formed (Fig. 3; column 4, lines 60-68; column 5, lines 1-2); after the first discrimination value is formed: the first time span of data input is shortened to a second time span of data input (column 2, lines 37-55; column 5, lines 2-5). However, *Jourjine* doesn't explicitly teach the second time span of data input is shortened to a shortened second time span if the second discrimination value is the same as the first discrimination value, the trained neural

network is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value and the network is utilized for the classification of a signal of an electroencephalogram while *Clymer* teaches the second time span of data input is shortened to a shortened second time span of data input if the second discrimination value is the same as the first discrimination value (column 11, lines 19-36); a second discrimination value is formed for the shortened second time span of data input; the second time span of data input is shortened and a second discrimination value is formed for each shortened second time span of data input, iteratively (column 3, lines 48-68; column 4, lines 1-11), until the second discrimination value is different from the first discrimination value (Abstract), *Ueda et al* teaches the trained neural network (column 2, lines 25-52) is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value and *Belmonte* teaches the network is utilized for the classification of a signal of an electroencephalogram (page 1, Introduction).

Motivation – The portions of the claimed system would have been a highly desirable feature in this art for simulating both the known and theoretical functioning of a biological neuron and more importantly, for simulating the neuron's function of learning (*Clymer*, column 1, lines 6-12) as well as setting the structure and weights of a neural network selected by the network selecting means and a discriminating algorithm appropriate to the selected category (*Ueda et al*, column 2, lines 16-24) and seeing some success in the application of ANNs to single-trial EEG analysis (*Belmonte*, page 3, right column, last paragraph). Therefore, it would have been obvious to one of

Art Unit: 2121

ordinary skill in the art at the time the invention was made, to modify *Jourjine* as taught by *Clymer*, *Ueda et al* and *Belmonte* for the purpose of simulating the neuron's function of learning, setting the structure and weights of a neural network selected by the network selecting means and seeing some success in the application of ANNs to single-trial EEG analysis.

Response to Arguments

Applicant's arguments filed October 11, 2005 have been fully considered but they are not persuasive.

Applicant refers to col. 2, lines 24-26 of *Jourjine* to define $td(t)$ and $tm(t)$ as an activation timing. However, $td(t)$ and $tm(t)$ are described as two cycles occurring simultaneously, the discrimination cycle and the memory cycle (col. 2, lines 37-38). Applicant argues that cell activation is not related to training the neural network with a sequence of inputs. The cell activation disclosed by *Jourjine* (col. 2, lines 37-55) makes the neural network learn external inputs which means the same as training it (see claim 1 of *Jourjine*, for example: "...including means for learning external input by extremizing a local functional of the total input of said cell's binary code by adjustment of the position of the time span of duration T_p within the larger time span T_c .")

Examiner agrees with applicant that *Jourjine* does not expressly disclose shortening the time period when there is no difference. However, 35 U.S.C. 103 rejection of claim 1 does not describe this limitation as being disclosed by *Jourjine*. *Clymer* teaches shortening the second time span to a shortened second time span if the

Art Unit: 2121

second discrimination value is the same as the first discrimination value (col. 11, lines 19-36). Thus, the rejection is not just based on the teachings of Jourjine alone but on a combination of references. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In view of presented arguments, claims 1-16 stay rejected under 35 U.S.C. 103(a).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sergey Datskovskiy whose telephone number is (571) 272-8188. The examiner can normally be reached on Monday-Friday from 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight, can be reached on (571) 272-3687. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S.D.

Assistant examiner

A.U. 2121



Anthony Knight

Supervisory Patent Examiner

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